Intellectual Capital and Knowledge Systems

Course Manual
Code EBC4085
Period 5
Faculty of Economics and Business Administration
Maastricht University

Academic year: 2010-2011
This version: April 14, 2011

1 General information

1.1 Course description

The objective of this course is to analyze what intellectual capital actually comprises (*e.g.* social capital, human capital) and what its role is with respect to the economic performance of organizations and economics. Human capital theory is discussed to understand the different types of intellectual capital and returns. In addition, the measurement of intangible assets such as intellectual capital and skills is also be addressed, emphasizing the measurement of intellectual capital within companies and the value of skills in labor markets. Next to theory, empirical papers and empirical analyses are discussed to see to what extent theoretical concepts hold in real life situations.

The course consists of two parts:

1. Theory and concepts
2. Empirical applications

Ad 1: Theory and concepts
Apart from the introduction there are six theory meetings in which different aspects of the relevance and measurement of the various forms of intellectual capital are discussed. For each meeting two or three papers have been selected that are discussed during the meeting. Students are supposed to read these papers to prepare for the meeting and can also look for related literature. Remaining questions that arise from this discussion are input for the discussion of the next theory meeting.

One student will be discussion leader for a session / article (to be decided upon by tutor). This discussion leaders prepares some questions about the article to facilitate discussion in the tutorial meetings.

Ad 2: Empirical applications
There are four empirical sessions, during which students will work with data about intellectual capital. The data will be analyzed using STATA. In the introduction to the course, a demonstration will be given about how to analyze data with STATA. Additionally, the data sets used for this course are presented. For each of the next empirical meetings, students are expected to analyze a data set that is available

on EleUM. This can be done in small groups. The main findings of each group should be available for projections (*e.g.* as a powerpoint presentation), to facilitate discussion of the findings in the meeting.

Assignment
Every student has to work on an individual assignment, reporting findings from empirical analyses using one of the data sets of the course. This assignment has to be 8-10 pages (excluding references and the appendix) and should include a clear description of the problem statement, a short theoretical background, the approach to analyze this question, the empirical results and a conclusion. The syntax used for the assignment, with clear comments to clarify the approach and using only the provided data as input, has to be included as an appendix. Topic suggestions will be posted on EleUM.

Students have to submit the problem statement and the analysis approach on **Thursday May 12 16h00** in order to avoid problems with an infeasible problem statement and to assure early start of the assignment. At Monday May 26 16h00 there is an opportunity to hand in a preliminary version of the assignment to receive feedback on the Thursday meeting in the same week. The final assignment has to be send to e.feron@maastrichtuniversity.nl and should arrive **before Thursday June 2, 16h00**. This is a *very* serious deadline (16h01 implies that you failed on the assignment).

In Section 3 below, important instructions are presented on how to (i) find additional relevant literature in the library and on the internet; (ii) write a paper for the assignment; and (iii) present your work in the most effective way.

1.2 Planning group

- Prof. Dr. Lex Borghans (coordinator)
- Dr. Trudie Schils

Eva Feron is the tutor for this course.

1.3 Schedule

The group meetings are scheduled on Mondays and Thursdays between 08h30 and 10h30

The schedule is as follows:

Date	**Task / activity**
Mon April 18	Task 1 Introduction to the course and STATA
Thu April 21	Task 2 (T) Human capital theory
Mon April 25	No meeting due to Easter
Thu April 28	Task 3 (E) Literacy and schooling as measures of human capital
Mon May 2	Task 4 (T) Informal learning
Thu May 5	No meeting due to Liberation Day
Mon May 9	Task 5 (T) Selection bias
Thu May 12	Task 6 (E) Selection into training
Mon May 16	Task 7 (E) Measuring skills
Thu May 19	Task 8 (T) Depreciation of skills
Mon May 23	Task 9 (E) Measuring depreciaion of skills
Thu May 26	Task 10 (T) Encouraging human capital investment
Mon May 30	Task 11 Presentation of assignments

(T) Meeting on theory and concepts, (E) Meeting on the empirical applications.

Written Exam: see schedules for the exact date, time and location

1.4 Exam and grading policy

The final grade G for this course is constructed as follows:

$G = (1/4 * A) + (1/4 * Z) + (1/2 * E)$ if $E \geq 4.0$

$G = E$ if $E < 4.0$,

where A is the score on the assignment (including presentation), Z is the evaluation of the preparation for, participation and contributions in class (including the preparation for the practical exercises), and E is the score on the written exam. In order to pass for the course the final grade G should be at least 5.5.

There has to be sufficient attendance and participation. Students are allowed to miss two sessions but not the session in which the presentations are held. Students absent more than twice are required to fulfil a substantial writing assignment.

The written exam will cover all the literature of the course and will include questions in which you have to interpret STATA output and discuss the appropriateness of STATA syntax.

1.5 Communication

The EleUM page will also contain additional information on the course and will be updated regularly during the course.

2 Tasks

Task 1 Introduction to the course and empirical analyses using Stata

In the first hour of this meeting, a short introduction to the course, explaining the key concepts and issues of measurement, is presented. About 40 years ago several economists realized that the skills and knowledge of people are a major source of productivity. Comparing the role of knowledge to physical capital they labeled this "human capital". For a long time economists used human capital mainly as an abstract concept to theorize about the role of knowledge acquisition for economic performance. The usual measures were years of education and years of experience at work. Recently, attempts have been made to measure human capital more precisely. In this introduction present the concept of human capital, and the problems of measuring it.

In the second hour it will be demonstrated how STATA can be used for the empirical analyses. Using data from the International Adult Literacy Survey as an example it will be shown how a syntax or do-file can be created to calculate means, standard deviations, variances, percentiles and to run simple regressions. Students have to use these techniques to work on the empirical tasks in this course and the individual assignment.

Literature:

Borghans, L., F. Green and K. Mayhew (2001), 'Skills Measurement and Economic Analyses: An Introduction', *Oxford Economic Papers*, 53(3): 375-84.

Task 2 Human capital theory

During the 1960s some economists argued that investments in knowledge should be considered as investments in capital goods. The term human capital was introduced and human capital theory, initiated by Becker (1962) was developed. According to this theory, a firm can buy physical capital and then benefit from production made by this machine. Human capital is different, though. When a firm invests in a worker, he might leave and start working for another firm. An important issue is therefore who pays for the acquisition of human capital and what happens when

workers leave a firm.

Literature:

Becker, G. S. (1962), 'Investment in human capital: A theoretical analysis', *The Journal of Political Economy*, vol.70 (5/2): 9-49.

Ben-Porath, Y. (1967), 'The production of human capital and the life cycle of earnings', *The Journal of Political Economy*, vol. 75 (4/1): 352-365.

Lazear, E. P. (2003), *Firm-specific human capital: A skill-weights approach*, IZA Discussion Paper no. 813, Institute of Labor Studies: Bonn.

Task 3 Literacy and schooling as measures of human capital

In the 1990s the OECD carried out a large assessment program to measure literacy in several member states. Its goal was to create comparable literacy profiles across national, linguistic and cultural boundaries. The survey also offers the world's largest source of comparative data on participation in adult education and training. This gives us information about the knowledge of people beyond the usual measures of schooling. Use the International Adult Literacy Survey (ials.dta) to analyze the following questions:

1. What are the differences in human capital between countries?
2. How is human capital related to sex or age?
3. Is there a link between years of schooling and literacy?
4. What is the link between human capital and earnings?
5. Is this relation between human capital and earnings different between countries?

Literature:

Human Resources Development Canada en Statistics Canada (2003), *Highlights from the second report of the International Adult Literacy Survey*, Canada.

Task 4 Informal learning

Apart from formal investments in human capital by education and training, people build their human capital by learning on the job, merely by experience. Such infor-

mal learning is more difficult to measure, but not less important to human capital development within a person, or within a country.

Literature:

Eraut, M. (2000), Non-Formal Learning and Tacit Knowledge in Professional Work, *British Journal of Educational Psychology*, 70 (1): 113-36.

Destré, G., L. Lévy-Garboua and M. Sollogoub (2008), Learning from experience or from others? Inferring informal learning from a human capital earnings function with matched employer-employee data, *Journal of Socio-Economics*, 37: 919-938.

Task 5 Selection bias in returns to education

Education plays a central role in modern labor markets. Hundreds of studies in many different countries and time periods have confirmed that better-educated individuals earn higher wages, experience less unemployment, and work in more prestigious occupations than their less-educated counterparts. Despite the overwhelming evidence of a positive correlation between education and labor market status, social scientists have been cautious to draw strong inferences about the causal effect of schooling. In the absence of experimental evidence, it is very difficult to know whether the higher earnings observed with better-educated workers are caused by their higher education, or whether individuals with greater earning capacity have chosen to acquire more schooling. Many analysts believe that the measured partial correlation between schooling and earnings significantly overstates the true causal effect of education. Simple OLS analysis will result in a biased estimate of the true causal effect of education. This bias is commonly referred to as the selection effect.

Literature:

Leuven, E. and H. Oosterbeek (2008), 'An alternative approach to estimate the wage returns to private-sector training', *Journal of Applied Econometrics*, 23: 423-434.

Leigh, A. and C. Ryan (2008), ' Estimating returns to education using different natural experiment techniques' , *Economics of Education Review*, 27: 149-160.

Bedi, A.S. and N. Gaston (1999), 'Using variation in schooling availability to es-

timate eductional returns for Honduras', *Economics of Education Review*, 18: 107-116.

Task 6 Searching for the selection effect In 2004, the Research Centre for Education and the Labour Market (ROA) and the Centre for Innovation of training (CINOP) initiated a survey on lifelong learning in the Netherlands, by adding questions on this subject to the DNB Household panel of centER data. This Life Long Learning Survey attempts to measure formal and informal learning. Use the Life Long Learning Survey (llls.dta) to answer the following questions:

1. Is there a selection of any kind? If yes, describe it as detailed as possible.
2. How to correct for this selection bias?

Task 7 Measuring skills

In 1997 the British Skills Survey (bss.dta) was started with the following objectives: to further develop the concept of and methodology for measuring different types of skills using an employee survey; to investigate the impact of various antecedents on skills, including personal characteristics and, especially, forms of education and training; to investigate the impact of various skills on pay; to investigate which skills are changing during the 1990s; to investigate how skills are distributed among the employed population and how far the pattern of skill and skill change corresponds to a learning society, and consider appropriate policy conclusions. The British Skills Survey uses self assessment to measure a wide range of skills. Choose a couple of skills and analyze the following:

1. What is the value of this skill in the labor market?
2. Is this value the same across industries?
3. How are wages affected by the specificity of skills?

Literature (optional):

Tomlinson, M. (1997), *'Measuring competence and knowledge using employee surveys: evidence using the British Skills Survey of 1997'*, Paper prepared for the DRUID summer Conference on Industrial dynamics of the new and old economy, Copenhagen, 6-8 June, 2002.

Task 8 Depreciation of skills

Like physical capital also human capital can depreciate. One potential reason is that people really forget and thus loose skills, but knowledge might also become outdated. Whether or not skills depreciate might depend on the use of skills and training to combat depreciation.

Literature:

Grip, de A. and J. van Loo (2002), 'The economics of skills obsolescence: A critical review', in De Grip, Van Loo and Mayhew, *The economics of skills obsolescence: Theoretical innovations and empirical applications*, pp. 1-26, Amsterdam/Boston: JAI.

Mincer, J. and H. Ofek (1982), 'Interrupted work careers: Depreciation and restoration of human capital', *The Journal of Human Resources*, 17 (1): 3-24.

Edin, P-A and M. Gustavsson (2005), *Time out of work and skill depreciation*, IFAU Working paper 2005:21, Institute for Labour Market Policy Research: Uppsala.

Task 9 Measuring depreciation of skills

In 2004, the Research Centre for Education and the Labour Market (ROA) and the Centre for Innovation of training (CINOP) initiated a survey on lifelong learning in the Netherlands, by adding questions on this subject to the DNB Household panel of centER data. This Life Long Learning Survey attempts to measure formal and informal learning and the growth and depreciation of skills. Use the Life Long Learning Survey (llls.dta) to answer the following questions:

1. Is there a difference between the skill level today and two years ago and does it vary with age?
2. How does participation in training affects this difference in skill level over two years?
3. How do skill, age and training participation affect wages?
4. Is this relation different for workers at different ages?
5. What are the determinants of skill growth?

Task 10 Encouraging human capital investment

In recent years the concept of lifelong learning has been put high on the EU agenda. It refers to recurrent education and training during the individual's life-cycle, i.e. not only concentrated at the beginning of the life-cycle. It is believed investments in lifelong learning enhance workers' employability and contribute to higher participation rates, including those of older workers.

Literature:

Heckman, J.J. (2000), 'Policies to foster human capital', *Research in Economics*, 54: 3-56.

Jenkins, Andrew, Anna Vignoles, Alison Wolf, and Fernando Galindo-Rueda (2003), 'The determinants and labour market effects of lifelong learning', *Applied Economics*, vol.35, pp. 1711-1721.

Task 11 Presentations of the assignments

In this meeting every student can present his or her assignment. Approximately 12 minutes per student will be available, so students have to present the main message of the assignment in 8 minutes to leave 4 minutes for questions and feedback. Therefore they should really focus on the main question and results and use not more than five power point slides.

3 Literature, assignments and presentation

3.1 Literature

In your search for more interesting literature, you will have to make use of different sources. Leading journals in this field are the Quarterly Journal of Economics, the American Economic Review, the Journal of Political Economy and the Economic Journal. Also Oxford Economic Papers has published several papers about skill measurement. Important field journals are the Journal of Labor Economics, the Journal of Human Resources, Labour Economics, Journal of Intellectual Capital, and Management Decision. It takes some time before a paper is published in a journal. Many important contributions to the literature are published by the NBER (www.nber.org) as working papers before they appear in journals.

The Electronic Library FdEWB gives you access to a variety of these economic journals (www.ub.unimaas.nl/fdewb/). In the E-journal database, you find a long list with all journals available in electronic format. Since IT became important in publishing only recently, it might be the case that older papers are not available on-line. JSTOR provides scans of all the volumes of the main journals. At the library pages you will also find the Ebsco Host database, which gives you the possibility to perform subject searches. In the Ebsco database you will also find Econlit, a database containing information on many economic journal articles and books.

3.2 Assignments

Please take into account the following instructions very carefully. In terms of the setup and content of the paper we would like to receive the following:

Introduction
Start the introduction with a relevant puzzle for the purpose of your paper. This immediately attracts the attention of the reader. For example: “Many great disasters have happened mainly to poor countries and the developed countries have offered help in recovering. Looking at aid figures from 1960 to 2000 it turns out that the developed countries have on average spent 0.1 percent of their GDP to foreign aid. This aid has, however, not been donated to those countries that were hit hardest by

disasters. For example, the Dutch government has donated t million euros to the f victims of war in Congo while providing aid of the amount of $u > t$ million euros after El Niño hit the Caribbean with far less than f victims and damage".

After you have described the puzzle you raise the central question of the paper. For example: "Why is it that some disasters gain more attention in terms of donations than others?" Then you tell the reader *how* you will approach the question from a theoretical point of view and what the crucial ingredients are. For example: "To answer this question we will develop a model of donations in which media attention and former colony linkages play a prominent role. To do so, we develop a model in which both media coverage and linkages determine the amount of money donated. ..." After that you briefly describe the results of the modeling approach. For example: "The main results of the model are that media attention for a certain disaster spreads rapidly through the developed countries especially between countries with similar colonial linkages. This yields a higher number and amount of donations. ..."

The next paragraph deals with the empirical implementation of your study. For example: "Empirical support for the model comes from data collected by the World Bank and available in the Disaster and Risk database. The empirical strategy is to look whether the number of occasions at which a disaster has been mentioned at CNN and has appeared in the New York Times is correlated with the amount of donated money. In addition, ...". Then you briefly preview the empirical results of your study. For example: "Our estimates suggest a strong link between former colonial linkages and spending after a disaster has taken place. Furthermore, we find ..."

Finally, you present the set up of the paper, i.e. the outline. For example: "We proceed as follows. First, we present in Section 2 a theoretical approach to understand the economics behind donations and the possible connection to being a former colony. Second, we present the data and some descriptive features of the data. In Section 4 the estimates of our empirical analysis will be presented and discussed. We end with a conclusion.".

Literature and theory

In this section you develop your theory of approaching the central question of the

paper in more detail. Make sure that the theory is able to answer the question to the best extent possible. You also discuss the relationship of your theory to the already developed approaches by making a comparison and by stating how your theory is different of innovative.

Since in the assignment of this course the focus is on the empirical work, you might also skip this section and provide the relevant information in the introduction.

Data and descriptives
The main aim of this section is to present the data sources you will be applying to test the predictions of the theory developed above. First, present the name and interesting features of the data. Second, present some relevant information. For example: "The data provided by the World Bank allow us to distinguish donations by country. In Table Q we present the donations by continent of all donating countries in the period 1960-2000. If the numbers are printed in bold, this means that a country has former colonies on this continent. The numbers in Table Q suggest ..." Of course you can also use figures if that is more appropriate. Especially if you are analyzing long time series this is a convenient way to give the reader insight in some basic relationships and trends. Finally, you present the empirical set up by showing how your data are suited to tackle the central question of the paper.

Empirical results
In this section of the paper you present the estimation results (DO NOT mention the software package you have used for this). First, present and thoroughly discuss the basic results of the core equation you have estimated. Tell the reader how your results are consistent with the theory developed in Section 2. Second, present further estimates showing the robustness of your analysis. This can be done by adding more relevant control variables to the regression analysis (in the disaster example we could add how poor the country was before the disaster); splitting the data source into different groups (by continent or level of income, or number of victims, or damage in euros), and so on. Make sure that this further analysis is relevant and discuss why it is relevant!

Conclusion
The conclusion (i) concludes the paper; (ii) summarizes very briefly the main findings; and (iii) presents avenues for future analysis. For example "This paper has

shown that donations after the occurrence of disasters are strongly linked to being a former colony and even more so to being mentioned at CNN and in the New York Times Our findings can be summarized as follows: What this paper lacks is an analysis of the specific aid that is being donated. For future research it would be interesting to analyze if donations come in terms of money or goods, because . . . ".

References
Maintain the following form:

Journal article:	Name, First name, and First name Name (year), 'Title of the paper', *Journal*, vol.X (no.Y), pp. ZZZ-ZZZ.
Example:	Katz, Lawrence F., and Kevin M. Murphy (1992), 'Changes in relative wages, 1963-1987: supply and demand factors', *Quarterly Journal of Economics*, vol.107 (no.1), pp. 35-78.
Book:	Name, First name (year), *Title of the book*, publisher: city
Example:	Helpman, Elhanan (1999), *General Purpose Technologies and Economic Growth*, MIT Press: Cambridge MA.

General setup of the paper

Page 0:	Title of the paper, abstract of 100-150 words, names and ID-numbers of the students, group number, assignment number (1-3), name of the tutor, date of delivery
Page 1:	Introduction as described above
Page 2:	Literature review and theoretical approach of the problem
Page 3-4:	Setup of the analysis, short description of the data, and descriptive features of the data.
Page 5-6:	Empirical results from estimating the (reduced form of the) model
Page 7:	Conclusion
Page 8:	References
Page 9:	Appendix

Standard layout features

Line spacing:	1.5
Margins:	2.5cm everywhere
Paper size:	A4
Font:	Times New Roman
Page numbers:	Bottom centre, roman numbers (1, , 11)
Alignment of text:	Left or justify
Tables:	Number the tables 1, , n. Each table has a self-containing title
Figures:	Number the figures 1, , n. Each figure has a self-containing title

Do not use headers and footers

3.3 Presentation

In your presentation make sure that (i) there is not too much information on the slides, (ii) everybody is able to read your slides (large font size, and white background work best etc. etc.), (iii) you address your audience directly (don't look to the wall) and enthusiastically in presenting your paper, and (iv) answer questions during and after your talk in a professional and clear manner.